

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
8 April 2004 (08.04.2004)

PCT

(10) International Publication Number
WO 2004/029221 A2

- (51) International Patent Classification⁷: C12N
- (21) International Application Number: PCT/US2003/030965
- (22) International Filing Date: 29 September 2003 (29.09.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
- | | | |
|------------|--------------------------------|----|
| 60/414,065 | 27 September 2002 (27.09.2002) | US |
| 60/414,258 | 27 September 2002 (27.09.2002) | US |
| 60/414,102 | 27 September 2002 (27.09.2002) | US |
- (63) Related by continuation (CON) or continuation-in-part (CIP) to earlier applications:
- | | |
|----------|--------------------------------|
| US | 60/414,065 (CIP) |
| Filed on | 27 September 2002 (27.09.2002) |
| US | 60/414,258 (CIP) |
| Filed on | 27 September 2002 (27.09.2002) |
| US | 60/414,102 (CIP) |
| Filed on | 27 September 2002 (27.09.2002) |
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- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:**
— without international search report and to be republished upon receipt of that report
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: MICROFLUIDIC DEVICE FOR CELL SEPARATION AND USES THEREOF

(57) Abstract: The invention features methods for separating cells from a sample (e.g., separating fetal red blood cells from maternal blood). The method begins with the introduction of a sample including cells into one or more microfluidic channels. In one embodiment, the device includes at least two processing steps. For example, a mixture of cells is introduced into a microfluidic channel that selectively allows the passage of a desired type of cell, and the population of cells enriched in the desired type is then introduced into a second microfluidic channel that allows the passage of the desired cell to produce a population of cells further enriched in the desired type. The selection of cells is based on a property of the cells in the mixture, for example, size, shape, deformability, surface characteristics (e.g., cell surface receptors or antigens and membrane permeability), or intracellular properties (e.g., expression of a particular enzyme).